COMPRESSOR MOTOR-END BEARING HAVING OIL LEAKAGE PATH

BACKGROUND OF THE INVENTION

[0001] This application relates to a compressor having fluid flow passing over a motor, and having an oil leakage path for directing oil away from the path of the fluid on its way to the compression chamber(s).

[0002] Compressors are known having a motor chamber sealed from the environment and having the working fluid passing through it. In one common type of such compressor, the fluid to be compressed, or working fluid, passes over the motor on its way to the compression chamber(s), cooling the motor. Such compressors often have shaft bearings lubricated by oil. Typically, the motor chamber ends in a bearing mount receiving a motor-end bearing. Lubricant is directed to the motor-end bearing, and can leak outwardly of the bearing at each end. When the lubricant leaks outwardly of the end of the bearing spaced toward the motor, it comes into contact with the motor rotor, which is rotating. The motor rotor throws a portion of this lubricant into the flow of fluid heading toward the compression chamber(s). This brings an undesirably high amount of lubricant into a compression chamber along with the fluid to be compressed.

SUMMARY OF THE INVENTION

[0003] In the disclosed embodiment of this invention, the motor-end bearing and its mount are provided with a leakage path to drain the lubricant away from the end of the bearing adjacent the motor rotor. Instead, the lubricant received within the motor-end bearing is directed to an opposed side of the bearing, and away from the rotating rotor. Thus,

less lubricant is thrown into the path of the fluid leading to the compression chamber(s), and less lubricant is entrained with the fluid to be compressed.

[0004] In preferred embodiments of this invention, the relief passages include a passage extending through the bearing mount, and to an opposed end of the bearing mount remote from the motor rotor. Various arrangements of washers, seals and relief passages are disclosed in several embodiments.

[0005] These and other features of the present invention can be best understood from the following specification and drawings, the following of which is a brief description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] Figure 1 is a cross-sectional view of a prior art motor and compressor assembly.

[0007] Figure 2 shows a prior art bearing mount for the compressor of Figure 1.

[0008] Figure 3 shows a first embodiment inventive bearing mount for the compressor and motor of Figure 1.

[0009] Figure 4 shows a second embodiment.

[0010] Figure 5 shows a third embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0011] Figure 1 shows a compressor and motor arrangement 20 having an inlet flow path 22 entering a sealed motor chamber 23. As shown, the fluid to be compressed passes over the motor stator at 24 through passages, as known. A suction plenum 26 communicates with compression chambers 28 having pistons 30. Thus, the fluid to be

compressed passes into inlet 22, along path 24, into suction plenum 26, and then into chambers 28. This fluid is compressed and passes outwardly through an exit port 29. As also shown, a shaft 32 drives the pistons 30 for reciprocation within their respective chambers 28. A housing 34 for receiving the pistons includes an oil sump at 38. As is known, an oil pump and passage arrangement 37 moves lubricant from the sump 38 into a path 36 within the shaft 32. Lubricant is delivered along the length of the shaft 32. Although this invention has been disclosed for a reciprocating piston type compressor, it would also apply to compressors of other types having an enclosed motor chamber.

[0012] As shown at 40, 42, and 44, a bearing 50 adjacent to the motor has lubricant being returned outwardly in several directions. The bearing 50 is mounted in bearing mount 45. The motor rotor 48 is rotating in the vicinity of the returned lubricant at 40 and 44. This lubricant may thus be thrown upwardly and potentially into the path 24 of the fluid leading to the plenum 26. Thus, with the prior art, an undesirably high amount of lubricant may be entrained within the fluid to be compressed.

[0013] As shown in Figure 2, the prior art has this problem due to the fact that the oil path 36 extends to an oil supply line 52 for supplying oil to the bearing 50. As mentioned above, a bearing mount 45 mounts the bearing 50. Lubricant is thrown outwardly of the bearing ends as shown at 40 and 42. In particular, the lubricant 40 would come into contact with the rotating rotor 48, which would throw the lubricant upwardly.

[0014] One embodiment 100 of the present invention is shown in Figure 3. In embodiment 100, the shaft 32 is structured essentially similar to the prior art. However, the bearing 102 has an opening 104 to assist the flow of lubricant outwardly to a tap 106 leading to a drain passage 108. Notably, drain passage 108 extends to the remote end of the bearing

mount 45 from that which is adjacent the motor. Thus, leakage lubricant will pass from the passage 52, through the opening 104, into the tap 106, and to the drain passage 108. This lubricant will thus be returned as shown at 42. Significantly less lubricant is directed out of the other end, thus reducing the amount of lubricant that is thrown into the path of the fluid to be compressed.

[0015] Figure 4 shows another embodiment 109. In embodiment 109, the bearing 102 has a similar passage 104 as the prior embodiment, and a similar tap and relief passage 106 and 108. There is an oil retaining seal 107, further preventing the flow of lubricant to the end of the bearing 102 that is adjacent to the motor rotor. Further, there is a thrust washer 112 associated with the opposed side of the bearing mount 45. A relief 110 communicates with an end 108 of the drain passage, again to assist the flow of the lubricant to the remote side of the bearing mount 45, and away from the shaft 32.

[0016] Figure 5 shows yet another embodiment 200. In embodiment 200, the bearing 102 has a similar passage 104 as the prior embodiments, and a similar tap and relief passage 106 and 108. In addition, there is groove 118 in shaft 32 to enhance flow of lubricant leading to the tap 106. In this embodiment, there is again the passage 108 and the relief 110. However, the thrust washer 112 is provided with an oil drain cutout 114 on the side adjacent to the relief 110, again to assist the desired flow of lubricant to the sump.

[0017] In sum, the present invention discloses a number of bearing mounts that assist the flow of lubricant to a remote end of a motor-end bearing in a sealed compressor. This reduces the amount of lubricant that is entrained in the fluid to be compressed. Thus, problems such as discussed in the Background of the Invention section of this application are reduced.

[0018] Although a preferred embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.